



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

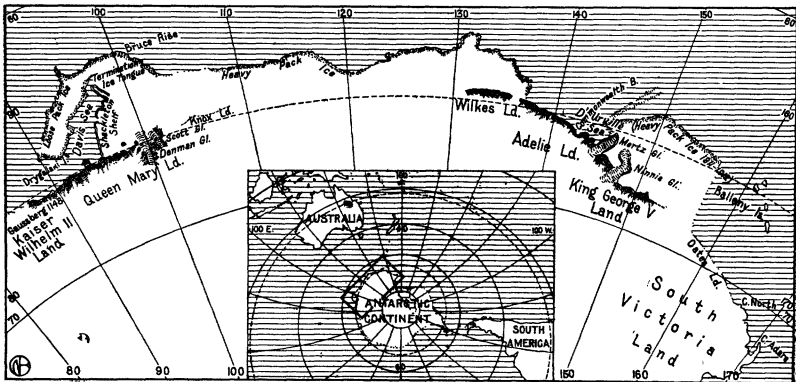
Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

THE AUSTRALASIAN ANTARCTIC EXPEDITION, 1911-1914*

The *Bulletin* has recorded from time to time the plans and progress of this expedition, with statements of the results as they have come to hand.¹ Sir Douglas Mawson, leader of the expedition, in his paper read before the Royal Geographical Society on June 19, supplied a comprehensive account of the entire work, with a summary of the scientific results.

The object of the expedition was to investigate the Antarctic Continent to the south of Australia, a region where the continent was supposed to extend far to the north, but concerning which only the most scanty information was at hand. Since 1840 no man had been within the limits of the Antarctic Circle



Map of the portion of the Antarctic Continent explored by the Australasian expedition, based on a map, in colors, in the *Geogr. Journ.*, Sept., 1914. Scale, 1:32,000,000.

The inset shows the extent of the main map and the relation of the Antarctic Continent to Australia and South America. See p. 39, note 2.

in the region selected by Mawson as a field of operations. The only information concerning this region was the following:

(1) In 1839, Balleny, in the sealing vessel *Sabrina*, reported the appearance of land near the Antarctic Circle in long. 120° E. It was chartered as Sabrina Land, but the Australasian expedition proved it to be non-existent.

(2) A French expedition under Admiral Dumont D'Urville, sailing south from Hobart in 1840, came within sight of about 150 miles of an Antarctic coast line, within the Antarctic Circle, between long. 136°30' E. and 142° E. He named it Adeline Land. The Australasian expedition confirmed the existence of this land.

(3) Lieutenant Wilkes of the United States expedition of 1840 "reported sighting land at frequent intervals during a long voyage from east to west

* Condensed from the *Geogr. Journ.*, Vol. 44, 1914, Sept., pp. 257-286, 5 sketch maps, map in colors and ills.

¹ Vol. 43, 1911, pp. 370-371; Vol. 44, 1912, pp. 122, 523-525, 918; Vol. 45, 1913, pp. 137, 448, 527, 691, 930.

close to the Antarctic Circle and in the very region to which our own [Mawson's] efforts were directed. Many of these reports of landfalls we have found to be erroneous. Notwithstanding such discrepancies, Wilkes's work is of much value. He outlined the northern edge of the pack, as it existed in 1840, and supplied several shallow soundings more convincing as to the proximity of land than his otherwise vague and oftentimes ill-founded statements. While criticizing the work of Wilkes, however, the magnificent seamanship and heroic determination of the leader should never be forgotten. The hazardous voyage of the *Vincennes* through 2,000 miles of ice-strewn sea in high southern latitudes, a zone where gales are frequent even in summer, will ever remain a great achievement.'²

The vessel fitted for the work was the *Aurora*, of 600 tons. Captain J. K. Davis was appointed master of the *Aurora* and second in command of the expedition. On the southward voyage a party was to be left at Macquarie Island. Wireless telegraphy was to be used for the first time in polar exploration, the Macquarie Island station transmitting Antarctic news to Hobart. The Macquarie Island party comprised five persons; the staff at the main Antarctic base, Adelie Land, included, besides Dr. Douglas Mawson, Lieut. R. Bage, astronomy, magnetics and tides; C. T. Madigan, meteorology; J. G. Hunter, biology, F. L. Stillwell, geology, and twelve others. Mr. F. Wild was appointed leader of the staff at the western Antarctic base with seven assistants.

The *Aurora* sailed from Hobart, Tasmania, on Dec. 2, 1911. Macquarie Island was sighted on Dec. 11. The habitable island is over twenty miles long and its greatest breadth is $3\frac{1}{2}$ miles. The chief vegetation is tussock grass and Kerguelen cabbage. The island has a remarkable population of birds and animals; sea-elephants are numerous and the place was once a favorite haunt of the valuable fur seal which the early sealers almost exterminated. Here a hut, cold storage plant and instruments for a year's work were landed. Eventually the wireless station was erected 350 feet above sea level.

Steaming south from Macquarie Island, the first ice was met in lat. 64° S. and further progress was much impeded until the afternoon of Jan. 6, when an ice cliff loomed ahead extending to the horizon in both directions. This proved to be an immense barrier tongue of ice—afterwards named the Mertz Glacier—pushing sixty miles out to sea from a great ice-capped land which had never been seen before. The *Aurora* steamed along this land for the next two days. Its continuity with Adelie Land was later proved and it was then

² On his map, in colors, Sir Douglas Mawson names a short stretch of the coast to the west of Adelie Land "Wilkes Land." It has, for years, been the practice of cartographers, in nearly all the map-making countries, to extend the name Wilkes Land along that part of the continent whose coasts he skirted, for a reason that was well expressed by Rear Admiral J. E. Pillsbury, U. S. Navy, in the *U. S. Naval Institute Proceedings*, Vol. 36, 1910, p. 468:

"This investigation establishes Wilkes's priority over D'Urville. The English sealer Balleny, in 1839, got a glimpse of land in about 121° East, but all he says regarding it is: 'saw land to the southward.' Neither D'Urville nor Balleny had any notion or made any suggestion that they were on the edge of a continent. Wilkes, on the contrary, not only sighted at frequent intervals some 1,600 miles of this coast but he recognized that it must be part of a continent. The name he gave to this land, the Antarctic Continent, must belong to the entire continent, the existence of which he revealed. Some geographers have recognized that the part of Antarctica he discovered needed a special name and therefore gave it the name of Wilkes Land. When it is remembered that Wilkes changed the conception that the Antarctic was an ocean, by demonstrating that it was a continent, the least that his discoveries demand is that the name of Wilkes Land be retained on all of Antarctica lying between the longitudes of 95° and 158° East."

decided to include it under the same name. The land rose everywhere from the sea to form a plateau. Only rarely did portions of the rocky platform break through the ice-sheet. Numerous rocky islets fringing the coast line are admirable breeding grounds for marine birds.

Some miles from the nearest portion of D'Urville's Adelie Land a suitable spot was discovered for a wintering station. This was a rocky outcrop, over a mile in extent, thenceforth known as Cape Denison. Rocks projected here from under the ice sheet within a sweeping indentation of the coast line which was named Commonwealth Bay. The coast here is dangerously bordered by rocky islets and reefs.

Upon discovering the wind-swept and desolate nature of this great land mass, Mawson decided to establish only two bases, amalgamating the smaller of the subsidiary bases with the main base. "In the light of subsequent events it was well we did this, for the climate and consequently the exploration of Adelie Land proved to be the toughest task on any yet known Antarctic land." By Jan. 19, the whole of the stores and gear of the main base were transferred to the shore. Then the *Aurora* started westward with the party under Mr. F. Wild. The stretch of navigable sea seen by D'Urville and Wilkes in 1840 was named D'Urville Sea. The coast of Adelie Land could be traced in a westerly direction, but on account of heavy pack the vessel could not follow along the coast, the only course being to skirt the heavy ice to the north and west. Following the heavy pack westward the coast of what Mawson calls Wilkes Land, about 132°-135° E. long., was noted on the chart. This was the last land seen until the icy slopes of land were discovered extending east and west as far as the eye could reach in lat. 66° S. and long. 94°23' E.

The sphere of operations of the German expedition of 1901 was now near at hand, for their vessel, the *Gauss*, had wintered, frozen in the pack, about 125 miles to the west. The land to the south, which the Germans visited by sledge over the pack ice, was eventually proved to be continuous with the land now sighted by the *Aurora*. The "high land" in the direction of Wilkes's Termination Land, seen by the Germans during a balloon ascent, was found to be a high ice-sheathed island about nine miles in diameter. To this the name of Drygalski Island was given. The position marked for Termination Land on Wilkes's charts proved to be occupied by pack ice and a barrier-ice formation (marginal shelf-ice). "The formation in question, trending about 180 miles to the north from the newly discovered land just referred to, was found to be very similar in character to the well-known rock barrier over which lay part of Scott's and Amundsen's journeys to the South Pole. This we named the Shackleton Ice Shelf. Its height is remarkably uniform, ranging between sixty and one hundred or more feet. Making allowance for the average specific gravity, this indicates an average total thickness of perhaps 600 feet. In area it occupies many thousands of square miles."

This wonderful block of ice originates from the glacier flow over the great plateau-land to the south. Every year an additional layer of consolidated snow is added to its surface by the frequent blizzards. These annual additions are marked on the face of the ice-cliff. A limitation is placed upon its increasing thickness, for the whole mass is ever moving slowly to the north, driven by the irresistible pressure of the land-ice behind. With this advance its northern face is crumbling away before the action of the sea, breaking down into bergs and brash-ice.

Much later the phenomenon of the breaking down of this cliff face was observed: "Suddenly a mass weighing perhaps a million tons broke away, first sinking down into the sea. Then followed an interval of a few minutes during which it majestically rose and sank alternately accompanied by a rapid splitting up. At the end of five minutes, only small bergs and brash-ice remained."

When the *Aurora* came within sight of the new land, Wild made a short journey towards it over the ice and, on his return, reported that the land was still twenty-five miles from the point he had reached and the ice was breaking up. Eventually a location was chosen for landing the party on the Shackleton Ice Shelf about seventeen miles from the land itself, the nearest approach possible by the ship. Here the hut, stores, coal and instruments were hoisted to the top of the cliff. The *Aurora* steamed away on Feb. 21, and when she ended the journey of 2,300 miles to Hobart, on March 12, nine tons of coal were all the ballast remaining.

The vessel was refitted in Sydney and deep sea dredging gear erected to secure samples of the bottom life in the deep ocean. She started on May 20, 1912, southward to investigate the ocean floor between Australia and Antarctica. A second cruise was made between Nov. 15 and Dec. 15, 1912. A large part of the work of both these voyages was the delineation of the floor of the ocean. The two most important results of these cruises were, first, the discovery of a submerged island-like plateau southward of and about the size of Tasmania; secondly, a trough depression was found to separate Macquarie Island from the Auckland Islands and others which stand upon the same submarine platform as New Zealand.

The main base party in Adelie Land prepared for autumn sledging and the journey began on March 1, 1912. The weather was bad and became worse on March 2, so that the party returned, leaving a loaded sledge on the plateau. From that date there was no slackening of the wind until far on in the spring. The sledge was not recovered until late in August. The party led a strenuous existence at winter quarters, buffeting with a sea of drifting snow. The average wind velocity for the whole year was fifty miles an hour. Hourly velocities of one hundred miles and more were common, and twenty-four hourly averages of over ninety miles were recorded. Pebbles were lifted and structures not buried in the *névé* were thrown down. Only a portion of the roof of the hut remained above the snow. Entrance to the hut was effected in fine weather by a trap door in the roof; at other times through tunnels in the *névé*. Such weather lasted almost nine months of the year. Even in the height of summer, blizzard followed blizzard in rapid succession. The winter quarters were near the center of a permanent anticyclone. The sledging gear was modified to meet the remarkable circumstances. Tents such as were used in the Ross Sea area were torn to ribbons. Two underground rooms were therefore excavated in the glacier ice at $5\frac{1}{2}$ miles and $11\frac{3}{4}$ miles from the hut where stores were accumulated for the summer sledging campaign. Not until November 7 was there sufficient moderation in the weather for a final start. Five diverging parties worked simultaneously so that a maximum of new ground was covered during the short sledging season.

Stillwell and two others mapped the coast line to the east as far as Mertz Glacier. They found a great number of rocky islets fringing the mainland. Silver, antarctic, Wilson and snow petrels, cape pigeons and other birds were

found nesting in large colonies. Further east, Madigan and two others reached 67°14' S. lat. and 150°21' E. long., found the sea frozen east of Mertz Glacier, crossed the fifteen-mile-wide tongue of the Ninnis Glacier and visited several headlands by the way. Near Horn Bluff, a sweep of coast line, bounded by rocky cliffs, is 1,000 feet high. There they discovered coal and carbonaceous shales outcropping at an elevation of several hundred feet, associated with red sandstone and capped by an immense thickness of columnar dolerite. Nearer to winter quarters only gneiss and schists are exposed. The land east of the Mertz Glacier was named King George V Land.

Mawson, Ninnis and Mertz made a sledge journey across King George V Land that ended most tragically. Their purpose was to map the coast beyond King George V Land; and they took with them all the dogs, the other parties hauling their sledges themselves. On Dec. 14, 1912, when they had traveled outward 311 miles over moving ice (glaciers) that was heavily crevassed, and were crossing the coastal highlands in 68°54' S. lat., 151°33' E. long., Ninnis, with his dog team and sledge, broke through the roof of a *névé*-covered crevasse and fell into an unfathomable depth below. Ninnis was doubtless killed instantly. All the dog food and most of the man food were lost on this sled. Under the circumstances, Mawson and Mertz, with six dogs, immediately started back towards the winter camp. Delayed by bad weather, the slender rations had to be reduced still further. The dogs gave out daily and the little flesh which they provided contained a minimum of nutriment and was difficult to digest. Still they struggled on and, in the first week in January, 1913, they were within 100 miles of the camp. But they were starving, and about midnight, on Jan. 7-8, Mertz passed away. After three weeks of creeping forward, Mawson came upon a cache of provisions, twenty miles from the hut, and was able finally to reach headquarters.

Of the other summer sledging parties from the main base one was led by Bage to the south, inland over the plateau, and another by Bickerton over the highlands to the west. After leaving the coast no sign of rock was seen, their track lying over a desolate wind-swept plateau. The wind seldom ceased; drifting snow was the rule, and the constant flow of air had cut, in the plateau surface of Adelie Land, deep *sastrugi* of such dimensions as are not met with elsewhere.³ Over these obstacles they dragged their sledges, in the face of the wind, for 300 miles out from the hut, nearly to the magnetic pole. There an elevation of 6,500 feet was reached. Hodgman and two others formed the western party. It passed over the highlands of Adelie Land seen by D'Urville, coming close to the coast in lat. 66°33' S., long. 138° E. where they saw the frozen sea to the west. One of the points of special interest was the finding of a piece of rock, a pound or two in weight, lying on the surface of the inland ice sheet far from any *nunataks*.⁴

Captain Davis sailed from Hobart to relieve the wintering stations on Dec. 26, 1912. He reached Commonwealth Bay on Jan. 12. All the sledging parties excepting that of Dr. Mawson appeared during the following two days. Davis made arrangements to leave a search party to remain for another year. He

³ Dr. Mawson apparently meant troughs. The word *sastrugi* is used in Siberia to indicate ridges of wind-blown snow running parallel with the direction of the air currents. It has been employed by Peary and other Arctic explorers in this sense.

⁴ This rock, according to Mawson, was quite unusual in appearance and may prove on examination to be a meteorite.

took on board all except the six men who were to remain and started on the 1,500 mile voyage to relieve Wild and his party at the western base. That evening, when fifty miles out to sea, Hannam, at the wireless receiver on the *Aurora*, heard of Mawson's return to the hut. A hurricane arose and prevented the ship from returning to his relief, so the vessel pushed through the pack at the north of D'Urville Sea and shaped a course westward. The western base was reached on Feb. 22, the men there and their collections were taken aboard, the ship departed at 9 p. m. on the same day and reached Hobart on March 15, 1913.

Mr. Wild with five other men had set out on March 13, 1912, to reconnoiter the coastal slopes of the mainland and establish two caches for sledging operations later in the year. A point 2,000 feet above sea level and thirty-five miles from the hut was reached. The snow buried their hut at winter quarters, and store houses were made by driving tunnels and chambers out in all directions into the snow. The floe ice had broken up at the end of summer and, until the following summer, seals or penguins were not to be had. The winter of 1912 was marked by frequent blizzards and heavy snowfall. On August 20, Wild with five men assisted by three dogs (all that remained) set out on a depôt-laying journey to the east. The food was cached on the Shackleton ice sheet eighty-four miles out. Temperatures as low as -47° Fahr. were experienced. Small *nunataks* and large islands were seen rising from the ice peak, and rocky cliffs appeared along the coast line of the mainland. It was found that the inland ice sheet, pressing forward, kept continually overthrusting great avalanches of ice, from one of which they had a narrow escape.

About the end of September, Jones, Dovers and Hoadley started to lay depôts over the sea ice to the west. About the same time Wild, Kennedy and Watson reascended the highlands south of their winter quarters. The summer sledging began at the end of October and early in November, one party going to the east, the other to the west. Starting on October 30, the eastern party, led by Wild, gained the depôt eighty-four miles out, and found the food, but the sledge that had been left to mark the spot, standing vertically and stayed with ropes, was not found. The wind had carried it away. At 120 miles east of their hut they came to the Denman Glacier, which descends into an embayment of the coast and then pushes out through the Shackleton ice shelf. Watson says that, viewed from the Shackleton ice shelf, right to the southern horizon is to be seen a stream of broken upturned ice, descending by cascade after cascade, and finally by still mightier cascades, till it reaches the level of the sea. It falls 3,000 feet in fifteen miles. Moving on, it meets and absorbs tributary flows, fills the whole bay with its maze of ice confusion and, spreading fan-fashion, sweeps on to the north in wide and widening billows of upturned impassable ice. It ploughs its way through the more sluggishly moving ice shelf. At the point of conflict at the sides there are mighty pressure ridges ranging up to 400 feet in height. Sea water was present in many cracks and crevasses. Although the seaward face of the shelf was over 100 miles away, the shelf had been rent to the bottom. An attempt was made to cross this chaos of ice, but it had to be relinquished. The party returned to the hut on Jan. 6.

The western party, Jones, Hoadley and Dovers, set out on Nov. 7 over the ice slopes and found progress very slow on account of the numerous crevasses. After a journey of 215 miles (not counting relays) they reached Gaussberg,

connecting with the work of the *Gauss* expedition. They returned to the hut on Jan. 21. The rocks met *in situ* on both these sledge journeys were crystalline schists and gneisses.

Summing up the expedition it may be said that new lands and islands were discovered and journeys were made over the sea-ice and the continental plateau in regions that had never been sledged over before. From the main base, journeys aggregating 2,400 miles were made and, from the western base, journeys of 800 miles. The land was followed through thirty-three degrees of longitude, twenty-seven degrees of which were covered by sledging parties; a fundamental meridian was established in Adelie Land, using wireless telegraphy; the continental slope was indicated by soundings and in most cases the continental shelf itself through fifty-five degrees of longitude; Macquarie Island was mapped. Extended observations were also made in the fields of terrestrial magnetism, biology, glaciology, meteorology, bacteriology, tides and auroral phenomena.